BY ORDER OF THE COMMANDER
AEROSPACE MAINTENANCE AND
REGENERATION CENTER

AMARC INSTRUCTION 21-127

15 SEPTEMBER 2000

Maintenance

FOREIGN OBJECT DAMAGE (FOD) PREVENTION

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements Air Force Policy Directive (AFPD) 21-1, *Managing Aerospace Equipment Maintenance*. It establishes the AMARC FOD program and assigns the responsibilities and procedures for FOD prevention, investigation and correction. It applies to Aircraft Management (LA), Plans and Programs (XP), and Logistics (LG) Directorates and the AMARC Safety (CC-SE), Quality Assurance (CC-QA) and Security (CCS) Offices.

SUMMARY OF REVISIONS

Updated office symbols. Deleted reference to an obsolete publication. Paragraph changes are indicated with an |.

1. Terms:

1.1. Foreign Object (FO). An item or article that is external or alien to the aircraft, major end item or component.

1.2. Foreign Object Damage (FOD). The damage or destruction of an aircraft, major end item or component from an FO that restricts or disrupts normal operations, causing a system or component malfunction or deterioration.

1.3. Critical AMARC FOD Areas. Areas which have a high potential for FOD such as:

1.3.1. Test cell, taxiways, ramps, runways, trim pads, engine shop and flight line.

1.3.2. Any process involving **assembly** of components that may be installed on weapons systems including shop components such as ejection seats, avionics equipment, etc. Give consideration,

particularly in tool control, to disassembly of components during reclamation that is for immediate reinstallation on active aircraft.

1.3.3. Any aircraft work within AMARC being accomplished for fly away from this installation. Reclamation shelter when used for processing out flyaway aircraft. The area will be marked off and posted as a FOD critical area.

1.3.4. Any work being done on an engine that is or will be installed on an aircraft being prepared for fly away from AMARC.

1.4. Non-Critical FOD Area. All other AMARC areas are determined to have a low potential for FOD.

1.5. Non-Reportable FOD. IAW AFMCI 21-122, minor nicks and blemishes on engine blades that require blending are only reported to CC-QA and the FOD Prevention Officer. Refer to AFI 91-204 for reporting requirements. A failure of engine parts or components that result in damage are not FOD but may be reportable under the Materiel Deficiency Reporting and Investigating System.

1.6. Reportable FOD. All FOD is reportable but the level and method of reporting is dependent upon the cause, value and extent of damage. If damage is not confined to the engine it is reported in another category. Refer to AFI 91-204.

1.7. FOD Mishap Cost Formula. (A+B)+(C+D) = E where A is component replacement cost, B is total man-hour cost to repair or replace damage parts within AMARC, C is the depot overhaul cost, D is the total depot man-hour cost to repair the item and E is the total FOD mishap cost. Use only the formula values that apply. **NOTE.** For safety reporting the man-hour cost will be that specified in AFI 91-204.

2. Responsibilities.

2.1. The AMARC Commander will appoint the primary and alternate FOD Prevention Officers in accordance with (IAW) AFMCI 21-122.

2.2. The AMARC Executive Director (CD) will chair the monthly FOD Prevention Committee meeting and determine the committee membership that, as a minimum, consists of representatives from:

2.2.1. CC-SE

2.2.2. Plans and Programs Division (XPX)

2.2.3. CCS

2.2.4. Flight Test (LA-FT)

2.2.5. Logistics Support Division (LGL)

2.2.6. Supply Division (LGS), Forward Supply Management Branch (LGSC), Tool Control Manager

2.2.7. Equipment Services Division (LAE)

2.2.8. Process In Division (LAI)

2.2.9. Process Out Division (LAO)

2.2.10. Reclamation Division (LAR)

2.2.11. Specialist Support Division (LAS)

2.2.12. Quality Assurance (CC-QA)

2.2.13. FOD Prevention Officer or alternate

2.3. The FOD Prevention Officer or alternate will:

2.3.1. Chair the FOD committee meetings in the CD's absence.

2.3.2. Administer the FOD prevention program; publicize FOD prevention programs and the AMARC FOD critical and non-critical areas.

2.3.3. Appoint the appropriate team members needed to investigate FOD incidents to ensure proper prevention techniques are used, determine if training is needed and then review their report.

2.3.4. Ensure that any FOD mishap investigation and report is coordinated with CC-SE and a report is submitted within 24 hours on AFMC Form 40, **Foreign Object Damage Record** to Headquarters, Air Force Materiel Command (HQ AFMC)/Depot Maintenance Division (LGP) in coordination with the LA director IAW AFMCI 21-122.

2.3.5. Report all class A, B, C or chargeable FOD incidents, i.e., to HQ AFMC/Maintenance Division (LGM) and LGP within 24 hours. Ensure all personnel errors resulting in FOD are reported.

2.3.6. Perform a monthly inspection for potential FOD, to include AM-2 matting and taxiways. Review any vehicle tire damage reports for possible FOD application.

2.3.7. Notify CC-SE when an FOD mishap has occurred.

2.3.8. Coordinate necessary FOD actions with the host-base FOD Prevention Officer.

2.3.9. Compile FOD data from other activities for the FOD Prevention Committee to determine possible AMARC preventive action.

2.3.10. Provide the Vehicle Control Office (XPXV) the information, training and procedures on FOD control and prevention to be included in the flightline driver's familiarization training IAW AFI 13-213, *Airfield Management and Base Operations*.

2.3.11. Ensure the FOD prevention committee meeting minutes are sent to HQ AFMC according to paragraph 2.6.3.

2.4. CC-SE will:

2.4.1. Notify CC-QA of an FOD incident.

2.4.2. Conduct FOD investigations and submit FOD incident reports IAW AFI 91-204.

2.5. CC-QA will:

2.5.1. Perform the impoundment IAW AMARCI 21-114.

2.5.2. Perform the responsibilities of the lost tool control monitor IAW AMARCI 21-107.

2.5.3. Ensure all tools found are brought to the attention of the FOD prevention officer and discussed at the FOD prevention meetings.

2.6. The FOD prevention committee will:

2.6.1. Conduct monthly meetings.

2.6.2. Appoint a recorder to take and publish the meeting minutes.

2.6.3. Send a copy of the meeting minutes to HQ AFMC/LGP within 15 calendar days of each meeting.

2.6.4. Develop, implement and publicize FOD incidents, awareness programs and training.

2.6.5. Review FOD publications, procedures and instructions for thoroughness.

2.6.6. Identify and publish changes and additions to critical and non-critical FOD areas.

2.6.7. Discuss all FOD incidents and preventive measures.

2.6.8. Discuss customer reported FOD on AMARC deliveries.

2.6.9. Review FOD prevention program status, accomplishments, improvements, motivation, recommendations, suggestions, initiatives, awards, publicity and any FOD problems.

2.6.10. Review tool control and accountability issues and AMARCI 21-107.

2.7. LA division chiefs and LGL or representatives will:

2.7.1. Be familiar with the requirements of referenced instructions.

2.7.2. Ensure all FOD incidents and unsatisfactory FO inspections are reported to the FOD Prevention Officer, request that CC-QA impound aircraft or equipment, and assign an impoundment official for FOD incidents IAW AMARCI 21-114.

2.7.3. Ensure no maintenance is done in FOD incident areas until cleared by the impoundment official and the FOD Prevention Officer. The CC-SE or appointed investigator must also clear maintenance in FOD incident areas IAW AFI 91-204.

2.7.4. Ensures annual personnel FOD awareness and prevention training is conducted IAW AFMCI 21-122.

2.8. LA and LG branch chiefs will:

2.8.1. Be familiar with the requirements of referenced instructions applicable to their areas.

2.8.2. Brief all personnel by directing the workers' attention to:

2.8.2.1. Developing positive attitudes toward preventing FOD.

2.8.2.2. Using preventive techniques in the industrial areas to preclude damage or failure of tires, windshields, propellers, control surfaces, and support equipment, as well as damage to aircraft and engines caused by items (tools, loose parts, etc.) left in aircraft, engines or support equipment.

2.8.2.3. Keeping areas clean and neat, ensuring foreign object containers are in use in all maintenance areas.

2.8.2.4. Performing operations and tasks according to technical data.

2.8.2.5. Account for all tools, equipment, technical data and hardware at the end of each task.

2.8.2.6. Wearing the proper clothing or articles.

2.8.2.7. Using equipment such as borescopes to locate and remove FO.

2.8.3. Each morning conduct an inspection of the branch areas including observing personnel performing maintenance to ensure their compliance with FOD prevention techniques. (Applicable to areas of aircraft and equipment operation and movement.)

2.8.4. Obtain the equipment needed to operate a good FOD Prevention Program, such as brooms, clothing, disposal containers, etc.

2.8.5. Ensure the FOD inspection equipment is used properly and work areas are continually policed to eliminate FOD potential.

2.8.6. Schedule the ramp sweeper equipment as needed through Transportation Branch (LAET). Notify the FOD Prevention Officer of problems that prevent scheduled cleaning.

2.8.7. Ensure all personnel inventory tools, parts, technical data and hardware before and after any maintenance on aircraft, engines and equipment.

2.8.8. Ensure inspection of the air intake for foreign objects before and after all engine rotations. The inspection time and a red X (cross) for red X condition is entered in the corrective action block of the AFTO Form 781A, **Maintenance Discrepancy and Work Document,** or the AFMC Form 958/959, **Work Control Document.** If the red X is documented on a AFMC Form 958/959 a P stamp is required.

2.8.9. Ensure the crew chief or specialist has:

2.8.9.1. Performed FOD inspections before closing access panels in FOD critical areas.

2.8.9.2. Inspected removed panels for damage and FO before reinstallation.

2.8.9.3. Ensured the fasteners are tightened during installation.

2.8.10. Inform the next level of supervision when FOD potential and inspection is beyond the branch's capability.

2.8.11. Ensure engine bay inspections are performed in FOD critical areas prior to engine installation and documented on AFMC Form 958/959 or AFTO Form 781A.

2.8.12. Require a red X or Production Acceptance Certification on all FOD inspections in FOD critical areas.

2.8.13. Ensure, when work is performed in and around jet engine intakes in FOD critical areas:

2.8.13.1. A red X or cross is entered on the AFTO Form 781A or the AFMC Form 958/959 after completion of maintenance in or around the intake area and after each aircraft ground engine run.

2.8.13.2. Intake run-up screens are properly used during ground run of gas turbine engines.

2.8.13.3. Screens are inspected for damage and cleaned before and after each use.

2.8.13.4. Before an engine run, nonessential equipment is removed from the area and other equipment secured to prevent exhaust damage.

2.8.13.5. Personnel working near operating engines are prohibited from wearing jewelry, hair fasteners of metal, plastic or leather, loose items of clothing such as hats or personal equipment that can be drawn into intakes.

2.8.14. Conduct quarterly employee briefings on FOD prevention and include the FOD prevention committee minutes IAW AFMCI 21-122.

2.8.15. Provide all newcomers a briefing on FOD prevention and tool control within 30 days of hire IAW AFMCI 21-122 to include the following:

2.8.15.1. Emphasize individual responsibility for parts, equipment, technical data, hardware and tool accounting to prevent FOD.

2.8.15.2. Shop, flight line, taxiway and hangar work policies.

2.8.15.3. Hardware, loose parts and tool control policies.

2.8.15.4. Wearing appropriate clothing and removing prohibited items such as watches, rings, chains, jewelry that could be dropped or become loose in FOD critical areas while performing maintenance.

2.8.15.5. FOD and potential FOD identification and reporting procedures.

2.8.15.6. Practicing good housekeeping at all times in all areas, especially in and around maintenance areas, flightline and taxiways.

2.8.15.7. Properly using correct technical data to perform operations and maintenance tasks.

2.8.15.8. Getting out of the vehicle to check vehicle and towed AGE and aircraft tires for FOD, prior to entering flight line or taxiways.

2.8.16. Schedule damage inspections and periodic cleaning of aircraft parking ramps, taxiways, trim pads, runways, equipment and storage areas.

2.9. All personnel, especially the mechanics and technicians, working or passing through flight line maintenance and launch activity areas will:

2.9.1. Be familiar with the requirements of referenced instructions.

2.9.2. Be aware of the need to keep the areas clean. Pick up all loose and foreign objects, and properly secure or dispose of items.

2.9.3. Report all potential FOD conditions to the immediate supervisor for further action when they can’t be corrected on the spot.

2.9.4. Inspect the maintenance stands and equipment for damage and remove debris and loose objects.

2.9.5. Inspect and clean the aerospace vehicle and the surrounding area before starting a maintenance task and place all hardware residue, cleaning rags, etc., in proper receptacles.

2.9.6. Empty FOD containers when full or determined necessary.

2.9.7. Plug or cap aircraft openings, ports, lines, hoses and ducts to prevent entry of FO into the systems. The devices will remain in place except when removed for access, such as entry of engine intakes and tail pipes.

2.9.8. Report damaged aircraft parking areas and taxiways to the facility manager and local base or airfield civil engineering authority for appropriate repair.

2.9.9. When vehicles are driven on to aircraft parking ramps and taxiways, check for rocks, debris, etc. that might have been scattered. Take appropriate action to clean the area.

2.9.10. Report aerospace vehicle FOD to the immediate supervisor.

2.9.11. Conduct the engine FO inspection before and after each engine rotation and document on the AFMC Form 958/959 or AFTO Form 781A. Include the time inspection was completed and place a red X in the forms as required.

2.9.12. When physical entry is required to engine intake and exhaust areas, ensure all loose objects, badges, pens, pencils, rings, watches, etc., are removed. Inspection personnel will wear pocketless coveralls (bunny suits) or equivalent to keep objects from dropping out of pockets where damage could result.

2.9.13. Any time an item (tool, piece of hardware, part, etc.) is lost while working on an aircraft, stop working and search for the item IAW AMARCI 21-107. The search may require nondestructive inspection techniques, including borescope and x-ray. Continue the search until the item is found or it is assured the item is not in the aircraft. If an item can't be found, annotate the maintenance records describing the situation and search procedures. Only the LA director or authorized official will release the aircraft.

2.9.14. Instruct all aircrews and maintenance personnel responsible for taxiing aircraft to be aware of potential FOD hazards to the inlet and exhaust areas when taxiing close to other aircraft or when operating engines in overhanging areas near ramps and taxiways.

2.10. Plans and Programs Division (XPX) personnel will empty the FOD cans around the ramp as required and when full.

3. Procedures:

3.1. CC-SE or LA-FT will make sure that a FOD ramp check is performed before each flight.

3.2. Anyone discovering or suspecting FOD will immediately notify their supervisor.

3.3. The supervisor will:

3.3.1. Notify Production Control Division, Master Scheduling Branch (LAAS), Production Control immediately.

3.3.2. If the FO damage is in the engine area, ensure no further work is done and that parts or items near the engine are not disturbed or removed.

3.4. LAAS, Production Control will notify CC-SE.

3.5. CC-QA will notify LAAS, Production Control, if the aircraft or engine is impounded and to post impoundment signs IAW AMARCI 21-114.

3.6. The FOD officer will assist CC-SE and assigned team members to conduct a thorough investigation and will prepare a FOD report for HQ AFMC/LGP to include the following:

3.6.1. Aircraft and engine serial numbers.

3.6.2. Date, time and place the FOD was discovered.

3.6.3. Work phase when FOD occurred (i.e., motoring, before flight, before ground run, etc.).

3.6.4. Extent of damage.

3.6.5. Probable cause.

3.6.6. Estimated FOD mishap cost IAW AFMCI 21-122, of materials and man-hours to repair.

3.7. Impoundment official will notify LAAS, Production Control when the impounded aircraft or engine is released.

3.8. LAAS, Production Control, IAW AMARCI 21-114, will:

3.8.1. Ensure impoundment procedures are followed.

3.8.2. Schedule the motorized sweeper from LAET to sweep the flight line A and B rows, parking pad 3, and taxiways Tuesday and Thursday mornings of each week. This will be accomplished using the daily schedule form. All other requirements for the sweeper will be called into LAAS, Production Control, as required.

PATRICK J. MULLOY
Director, Aircraft Management

Attachment 1

GLOSSARY OF REFERENCES

References

AFI 21-101, *Maintennace Management of Aircraft*

AFI 91-204, *Safety Investigations and Reports*

AFOSH Standard 127-100 (91-100), *Aircraft Flight Line Ground Operations and Activities*

AFMCI 21-107, *Tool Control and Accountability Program*

AFMCI 21-122, *Foreign Object Damage (FOD) Prevention*

AMARCI 21-107, *Tool Control and Accountability*

AMARCI 21-114, *Impoundment Procedures*